Music and Media Technologies 23 – 24
Dr. Fionnuala Conway
conwayfi@tcd.ie

Lecture 4: Unity: animation and interaction

Class topics

- Animation – set up an animation
    - Complex animation
- Interaction: using colliders to make interactions happen
- Breakout and discussion of Assignment 1

> Example: First Contact - great example of immersion, presence – designed by Oculus to showcase the possibilities for the Quest: https://www.youtube.com/watch?v=UbYe-NDQbyw&t=214s

Simple Animation

Simplest way to animate within Unity is using the Animation window. If you are proficient in After Effects, consider creating animations there and importing.

- Add a Sphere/Cube/other object to your Scene: Create 3D > sphere/cube and it should snap to the Scene. We are going to animate the object. (You can add to a new Scene or an existing one from earlier)

- Need to make a new animation to do so. **Think of the animation like a container where you hold the movement data for a graphical object.**

- Make new folder in Assets window and call it MyAnimations (Project window > Assets > Create folder). Open Animation window (*Window > Animation > Animation, (if window is not visible).

- Select any Gameobject in your Hierarchy window and you will see a Create button appear in the Animation window. Select other gameobjects and you will see it updates to reflect the object. (For example, Main camera, Light, Cube or Sphere.)
- Select the Sphere/Cube gameobject that you want to animate and you will see the Create button in the Animation window. Select Create and save the animation in your myAnimations folder. Call it something like myRotating_object. You have now created the animation container.
- You now need to identify the properties of the object that you would like to animate. (You might need to review the Gameobject separately in the Inspector window to make yourself familiar with the object parameters.)
- When you click Add Property, you will see a list of properties associated with the specific object. Usually Transform (position, rotation, scale) but can select other things, depending on the Gameobject.
- In this case, select Property > Transform > Rotation > press the + sign > then collapse the layer (press the arrow to the left of Cube:Rotation) to see x, y, z of the object.

Get familiar with the window controls:

- Expand the timeline area to the right. You will see diamond shape objects appear on the timeline that mark the start and end of the animation. These are known as keyframes in animation.

Music and Media Technologies 23 – 24
Dr. Fionnuala Conway
conwayfi@tcd.ie

- Press playback buttons (top of Animation window) to see the animation. Explore playback controls. We have not changed any of the properties so no movement is visible.
- Dopesheet and Curve (bottom of window): These offer two alternate views of the Animation timeline and keyframe data.
    - **Dopesheet** mode offers a more compact view, allowing you to view each property's keyframe sequence in an individual horizontal track
    - **Curves** mode displays a resizable graph containing a view of how the values for each animated property changes over time.

- Your timeline is probably defaulting to show you 1 second in milliseconds (timeline shows in milliseconds) so the animation will take place over 60ms. (Click the hamburger icon (top right of window) and select Seconds/Frames to view)

- **Make the animation longer than the default 60ms/1 second:** extend the animation time in the Samples area (turn on view Samples using the hamburger icon) to e.g. 3 seconds (Enter the value 180 (60ms x 3) value in the Samples space).
    - Move the playback line to the end of the Animation and then Add Keyframes button (diamond with a plus sign). You will see keyframes added to the end of the timeline. Now the animation should be extended out to 3 seconds/180ms. (Alter the time to suit your animation length/needs)
- Switch to Curves view

Create a simple animation

- To create a simple animation that makes the ball/sphere rotate, you want to set the starting position and the end position so that it looks like it rotates over the course of the playback.
- Move the playback head to the start keyframes and check that the x,y,z values are at 0. Move the playback head to the last keyframe and change value of y rotation to -360. The ball should take 3 secs to rotate on the y axis. Press play in the Animation window to view.

- Select Curves and view the movement on the graph

As you have set a start and end position, the software will inbetween the images that are needed to make the object look like it's moving.

-
- Class work:
    - Become familiar with the Animation window > You can add keyframes at other locations in the animation.
    - Try altering other parameters.
    - Make an animation with another gameobject like a Light (e.g. a dynamic moving light might look like a disco light!)

More complex animation

Complex animations are used to make more interesting visual material e.g. objects in First Contact; abstract visuals in Bjork videos.

- Review *First Contact*: https://youtu.be/F_o2VtqemNY

- Example: Bjork 'Notget' VR
https://www.youtube.com/watch?v=pJDcwXQc5CU

- Example: John Wildgoose – MMT, 2022, Thesis and project: Immersive Creation
    - Trailer - https://youtu.be/abfWpj2q8fU

- User Walkthrough https://youtu.be/mri7mMiOBE0
- Unity Development - https://youtu.be/zlCPfO_woPc

- Example: Keith Molloy, 2022 – Project: GothamAR

  Located in Lecture 4 > Lecture resources > Keith Molloy

  - Demonstration of project
  - Unity project walkthrough

A complex animation is a series of objects that affect each other but are viewed as a whole item.

- Class work:
  - Take a look at the Asset Store animated butterfly. ***(****View the Demo Scene to see the action (Assets > Butterfly (Animated)> Demo Scene folder > Doubleclick the Demo_Butterfly scene)*

  - Put the prefab from the butterfly animation into your Scene by dragging it into the Hierarchy window. Assets > Butterfly (Animated)> Prefab folder > Butterfly prefab

  - If you have the Animation window open, it should update to show you the Butterfly animation.
    Or – select the Butterfly prefab in the Hierarchy window > the Inspector window > collapse the Animation section > Take 001 is the container for the butterfly animation > doubleclick the Take 001 animation : the Animation window opens > playback the animation in the Animation window and examine the layers of the Butterfly animation and how each are animated e.g. left wing rotation
  - ***Examine the butterfly animation in the Animation window.***

Think about how you might include an animation in your Assignment project

  - Maybe there is something you made in After Effects that could be animated?

Tutorial work:

- Modify an animation that you have downloaded:
  - Most animations that you download, are read-only.
    In order to modify them (change elements or behaviours), you need to make a separate copy first.
  - Duplicate the animation > locate the prefab in the Assets folder > Edit : Duplicate and change the name of the new file e.g ButterflyFC

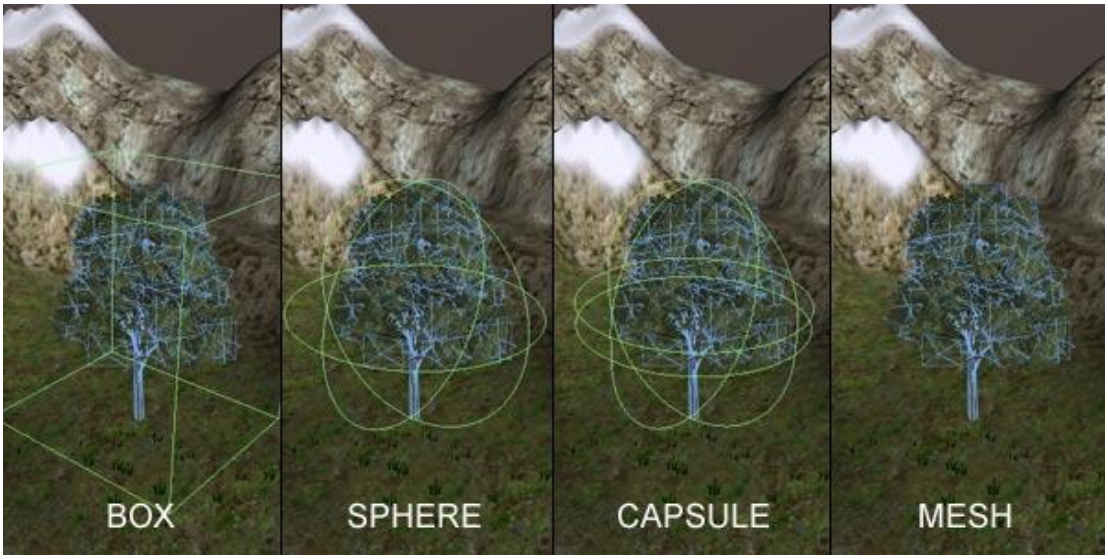
Music and Media Technologies 23 – 24
Dr. Fionnuala Conway
conwayfi@tcd.ie

Interaction and collisions

You need to implement some interaction in the assignment. This can be done in a straightforward way using colliders. You can also add more 'advanced' interaction using Unity scripting language (to be covered later).

Colliders are the main objects that allow us to set some rules around collisions for the objects in our scene, so we don't walk through walls or objects. Colliders come in different shapes and can be used for different types of objects.

- open the Scene you have been developing, specifically one that is using the FPC.
- in the Inspector window, examine some of your Scene Gameobjects e.g. Cube, Sphere, Terrain, Capsule trees. They each have some type of collider attached to them. (If you don't have them already, add a Sphere, Cube, Capsule, Terrain, tree.)
- ***NB: Terrain collider has Enable Tree Colliders setting so colliders should be on trees. This means that all trees, on a terrain, cause the player to stop. This can be observed in Play mode and when you build.***
- ***Think about the experience/identity of your player -*** *Remember that players expect to bump into objects.*



From Unity Manual

1. Class work: Examine assets specific to your world in the Inspector window and see if they have a collider associated with them.
2. View the objects and their colliders in the Inspector window e.g. specific parameters. You can edit the collision areas around these objects.
    a. Capsule – capsule collider
    b. Cube – box collider
    c. Sphere – sphere collider
    d. Plane – mesh collider

Music and Media Technologies 23 – 24
Dr. Fionnuala Conway
conwayfi@tcd.ie

Customised use of Colliders: editing a collider

1. Colliders tend to hug the object they are attached to: they sit as a bounding area around the object.
2. Useful application of editing the collider is where you make the collider bigger than the object. You might do this if you want to create an interaction with an object without the player needing to go right up to it. So, you create a larger boundary area (i.e. the collider) around the object. A use of this might be where you want the player to hear some associated audio in order to draw their attention to the object.
3. For example, an object, due to its shape, might have a mesh collider. *But you can add a box collider to define a large bounding area around it – this might be useful for adding sound fx to a tree object where you want the player to hear sounds as they approach the bounding area.*

How to add custom colliders to objects in your Scene:

In different scenarios we can use different types.

Box collider is typical on most objects – creates a box around something. Start with that.

- Add a box collider to the Sphere object
  - Select a Sphere (in Hierarchy) and view in Inspector : Add Component > type in Box and Box Collider will come up > select that and it will be added to the object > Edit Collider button – this allows you to edit the bounding area so follow instructions to alter size using Alt/Shift (Windows). (Grab the control handle (small green squares) on the Collider with Shift held down.)
- Or another way to edit a collider: if you need to, for example, make a box/sphere collider bigger > select Gameobject > Inspector > Collider > Edit Collider > change numbers in data e.g.for a capsule, you can change radius, height
- Other colliders allow for different parameters to change
- Class work: add a box, capsule, sphere etc collider to something else that they don't match.
  - Capsule - will change based on the volume or size of the mesh and is useful when the shape of something isn't even.

Also note, if you happen to use Probuilder to make buildings/structures, it automatically adds Colliders to objects.

Sphere collider – typically for spheres

Capsule – best for characters – FPC is a capsule.

Assignment 1 FOCUS

FIND A PARTNER AND DISCUSS YOUR INTENTIONS FOR THE ASSIGNMENT

What is the piece?

Why are you making this? What do you want us to experience? How would you like us to feel?

Have you any examples of work in this area? Are there other pieces of work that inspire you aesthetically, technically, because they focus on a particular area or outcome?

How are you integrating the assignment requirements?

Homework:

1. Animation: practise creating simple animations
    a. For example, animate another gameobject – try a light.

2. Think about possible interactions in your Scene.
    a. For example, audio could be added to various objects and colliders can be used to trigger playback
    b. Lighting might change
    c. Think about possibilities even if you don't know how to implement them yet. (They might require scripting or could be solved using Colliders)
    d. Add collision to objects in your Scene.
3. Start thinking about audio in your world and collecting some audio, if possible. It might be a general soundtrack or some sound effects. Or it could be multiple stems of audio if you have a piece recorded before.
    a. Collect some sound samples: browse the Unity Assets store for free audio (or other sources).
    b. Consider sharing audio: Blackboard space > Forum > thread called Sharing audio
    c. FYI: there is an Introductions thread there called Introductions. Take a look!

4. Assignment 1 progress – think about the focus of your application – e.g. a game, a cultural heritage interest, a therapy application, an educational application…

5. Playing VR apps from Steam Store:
   https://www.lifewire.com/play-steamvr-on-oculus-quest-or-quest-2-5090002

   Ordinarily, the only games your Quest or Quest 2 (which from here on out we'll refer to as the Quest) can download and play are the ones in the official Store, which you generally access from the VR environment in your headset.

   A feature called Oculus Link lets you "tether" your Quest to a computer via a USB cable in much the same way that PCVR headsets like the HTC Vive and Oculus Rift connect.

   When in Oculus Link mode, the Quest can play any VR games installed in your Steam library, giving you access to a whole new resource. Make sure to request a cable when borrowing a headset